



WATER-RIGHT DOCKET

Cumberland Gap National Historical Park

Docket No: 6

HENSLEY FLATS.

Supporting Hydro Data

00-00-0000: well drillers log

STATE OF TENNESSEE
Dept. of Conservation - Well Drillers Log

Log No. _____
Owner of well _____ address: street _____ city _____ phone _____
Well Contractor _____ License No. 70 Driller in charge of rig _____ Date well was completed _____
Location: Name of road _____ County in which well is located _____
N, NE, E, SE, S, SW, W, NW (circle one) of _____ (nearest town, school, store, etc.)

Tennessee Division of Water Resources
331-C Cordell Hull Bldg., Nashville phone, 741-2572

Do not write in this space.

Log of Well

Total Depth: 454 feet
Depth to the water-bearing zones:
(1) _____ feet
(2) _____ feet
(3) _____ feet

Yield of water-bearing zones:
(1) 5 gpm 90 feet
(2) 5 gpm 327 feet
(3) 3 gpm 404 feet

Water level _____ feet below land surface.
Quality of water, (sulfur, iron, oil, etc.) _____

Diameter of well: _____ inches from _____ feet to _____ feet
_____ inches from _____ feet to _____ feet
_____ inches from _____ feet to _____ feet

Cased to 21 feet with 8 inch Black casing (type)
Perforated casing from _____ feet to _____ feet

Screen diameter _____ inches, set from _____ feet to _____ feet
Type Screen _____ Slot size _____

Gravel pack from _____ feet to _____ feet

Purpose of well: Domestic, industrial, municipal, etc.

Remarks _____

Description of rock: Use field terms such as color of rock and type of rock material. Do not describe by geologic name.

Water information	Overburden above bedrock	From -Feet-	To
	Silt	0	5
	Sandstone white	5	10
	Sandstone	10	15
	Blk. Sandstone		
	Small Lamin Coal	15	20
	Gray soft Sandstone	20	25
	" "	25	45
	Shale	45	48
	Sandstone	48	105
	Coal	112	
	Slate	115	175
	Sand	180	278
	Coal	283	284
	Slate	284	289
	Sand	290	440
	Slate	440	454



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division

JAN 31 1968

*File
Moore
10-15-68*

522 W. Jefferson St., Rm. 310
Louisville, Kentucky 40202
January 29, 1968

Chief, Office of Land and Water Rights
Washington Planning and Service Center
National Park Service
1370 North Lynn Street
Arlington, Virginia 22209

Attention: Mr. Gary Moore

Dear Sir:

Replying to your telephone request of January 26, 1968, we are enclosing herewith the measurements of water level made during the recovery period following the pumping tests at the Hensley Flats and Sugar Run test wells, Cumberland Gap National Historical Park. We are also enclosing an additional copy of the summary of the measurements taken during the pumping test. The latter are not all the measurements taken, of course, but are the pertinent measurements.

After your telephone call, Bob Cushman contacted Woodie Mull relative to the possibility of encountering more water by deeper drilling at the existing wells. We wish to amend our statements with regard to the Hensley Flats well. Because the static water level in this well stands 240 feet below land surface, because the first water encountered was at about 300 feet, and because the rock was dry at depth, we feel that it may not be economically feasible to drill this well deeper. The chances of encountering additional water would not justify the cost and it would be best to drill a second well if additional water is needed. At Sugar Run, however, we still feel that additional water could be obtained by deeper drilling.

Sincerely yours,

F. F. Schrader
F. F. Schrader
District Chief

Enclosures

cc: D.S. Mull, Lexington, Ky., WRD

PROGRESS ON DRILLING OF TEST WELL AT HENSLEY FLATS,
CUMBERLAND GAP NATIONAL HISTORICAL PARK

Test well (8-inch diameter) located beside road to Chadwell Gap about 150 feet east of Job Corps Spike Camp.

(Time shown in Eastern Daylight. Depths in feet;
colors refer to wet samples.)

Tuesday, June 13, 1967

Driller moved rig onto site, set up, and drilled 19 feet.

0 - 10 Soil and sandstone, dark yellowish orange; weathered.

Wednesday, June 14, 1967

9:45 a.m. - Austin P. Whittaker, driller, arrived at well site.

10:00 a.m. - Drilling began.

10 - 20 Sandstone, gray, fine-grained.

10:30 a.m. - Attempt to install casing - casing stuck.

12:15 p.m. - Casing removed using hydraulic jack; hole reaming began.

1:20 p.m. - Reaming completed; 19 feet of 8-inch ID casing set;
drilling resumed.

At 22 Coal, few very thin beds.

20 - 35 Sandstone, medium-light-gray, fine-grained,
slightly micaceous.

35 - 45 Same with carbonaceous material in bedding planes.

45 - 48 Sandstone, dark gray, shaly.

48 - 54 Sandstone and siltstone, light gray, fine-grained,
hard drilling.

54 - 60 Sandstone, light gray, interbedded with siltstone,
dark gray.

60 - 64 Sandstone, medium-light-gray, fine-grained.

3:00 p.m. - Drilling stopped to replenish water used during drilling.

3:35 p.m. - Drilling resumed.

64 - 65 Sandstone, medium-light-gray, platy-bedded, micaceous bedding.

65 - 75 Sandstone, medium-light-gray, fine-grained, abundant carbonaceous laminae.

At 75 Same, but drilled softer.

75 - 85 Sandstone, medium gray, thin-bedded, carbonaceous laminae common.

5:15 p.m. - Drilling stopped. Driller returned to Tazewell, Tennessee, TD - 85 feet. Water can be heard running into well.

Thursday, June 15, 1963

9:45 a.m. - Joe Laws, driller, arrived at well site, changed drilling hammer, field tests were run on first water blown from hole at 85 feet. Results were as follows: (Water filtered before test) Chloride: 5 ppm; hardness: 2 grains per gallon (34 ppm); temperature: 57°F; pH: 7.0; iron: less than 0.6 ppm.

10:30 a.m. - Drilling began.

85 - 95 Sandstone, medium-light gray, few thin beds shale; few flecks of iron pyrite on carbonaceous laminae.

95 - 112 Sandstone, medium-gray, very fine-grained, carbonaceous laminae less common.

At 112 Coal, about 3-4 inches thick.

113 - 115 Shale, medium-gray, abundant sandstone laminae.

115 - 120 Shale, medium-gray.

120 - 125 Shale, medium-dark-gray.

125 - 135 Shale, medium-dark-gray, silty.

135 - 145 Shale - siltstone, medium-dark-gray.

- 145 - 155 Shale - siltstone, medium-dark-gray, scattered sandstone laminae.
- 155 - 168 Shale, medium-dark-gray.
- 168 - 169 Sandstone, medium-gray, very fine-grained, drilled hard.
- 169 - 175 Shale, dark-gray.
- 175 - 180 Shale, same as 169-175.
- 180 - 185 Sandstone, light-gray, hard.
- 185 - 200 Sandstone, light-gray, fine- to medium-grained, scattered thin shale laminae.
- 200 - 206 Sandstone, same as 185-200.
- 206 - 216 Sandstone, light-gray, fine- to medium-grained, shale laminae in lower 2 feet.
- 216 - 226 Sandstone, light-gray, fine- to medium-grained, scattered shale laminae.
- 226 - 236 Sandstone, light-gray, medium- to coarse-grained, conglomeratic, iron-stained quartz pebbles.
- 236 - 247 Sandstone, light-gray, medium- to coarse-grained, conglomeratic.
- 247 - 258 Sandstone, same as 236-247.
- 258 - 268 Sandstone, same as 247-258.
- 268 - 278 Sandstone, light-gray, medium- to coarse-grained, sparsely conglomeratic.
- 278 - 283 Sandstone, same as 268-278.
- 283 Coal, thin, 2-3 inches.
- 284 - 288 Shale, medium-dark-gray, silty.
- 288 - 300 Sandstone, light-gray, medium- to coarse-grained, sparsely conglomeratic.
- 300 - 315 Sandstone, same as 288-300.

315 - 320 Sandstone, light-brown, medium- to coarse-grained, slightly conglomeratic, well sorted, clean.

6:20 p.m. - Drilling stopped, driller returned to Tazewell, Tennessee. TD - 320 feet. Driller estimates well yielding 1-2 gpm.

Friday, June 16, 1967

9:45 a.m. - Joe Laws, driller, arrived at site.

9:50 a.m. - Drilling began. Field test of first water blown from hole at 320 feet. Chloride: 5 ppm; hardness: 2 grains per gallon (34 ppm); temperature: 57°F; pH: 7.0; iron: less than 0.6 ppm. Water can be heard flowing into well.

320 - 330 Sandstone, white to light-yellow, medium- to coarse-grained, some iron staining on quartz grains.

330 - 340 Sandstone, medium-yellow-brown, coarse-grained conglomeratic, iron-staining common.

340 - 350 Sandstone, white to light-brown, coarse-grained slightly conglomeratic.

350 - 360 Sandstone, light-brown, coarse-grained, conglomeratic, iron-stained quartz pebbles common.

360 - 370 Sandstone, yellowish-orange, coarse-grained, few pebbles.

Field test of first water blown from well at 370 feet. Results were as follows: Chloride: 5 ppm; hardness: 2 grains per gallon (34 ppm); temperature: 57°F; pH: 6.5; iron: less than 0.6 ppm.

370 - 387 Sandstone, pinkish-gray, coarse-grained, few quartz pebbles.

At 387 Drill penetrated crevice, drill dropped about 6-8 inches; water increased.

388 - 390 Sandstone and conglomerate, very coarse, many loose quartz pebbles, pebbles iron stained, reddish-brown.

390 - 392 Sandstone, pinkish-gray to white, very coarse-grained, quartz pebbles common, sandstone iron stained.

392 - 398 Sandstone, light-brown, medium- to coarse-grained,
medium- to very coarse-grained, few quartz pebbles.

398 - 400 Sandstone, grayish-pink, medium- to coarse-grained.

At 400 Crevice, bit dropped few inches.

400 - 403 Sandstone, same as 398-400.

403 - 404 Sandstone and conglomerate, pinkish-gray to
grayish-red, very coarse. Quartz pebbles
abundant, few as large as 1/4 inch in diameter,
driller says pebbles are from crevice.

At 404 Small crevice, bit dropped, water increased.

404 - 405 Sandstone, light-yellow-brown, fine- to medium-
grained, very few quartz pebbles.

405 - 414 Sandstone, light-gray, fine- to medium-grained.

At 414 Zone of reddish-brown iron stain, probably small
crevice.

414 - 418 Sandstone, light-gray, fine- to medium-grained.

418 - 425 Sandstone, light-yellow-brown, fine- to medium-
grained.

425 - 426 Sandstone, light-gray, fine- to medium-grained.

426 - 427 Sandstone, light-brown, fine- to medium-grained.

427 - 428 Sandstone, light-gray, fine- to medium-grained.

428 - 431 Sandstone, grayish-pink, medium- to coarse-grained.

431 - 440 Sandstone, light-gray, fine- to very fine-grained.

440 - 444 Sandstone, grayish-pink, medium-grained, few thin
shale laminae.

444 - 447 Shale, dark-gray, sandy.

447 - 452 Shale, medium-dark-gray.

4:30 p.m. - Drilling ceased. Well flushed with air about 15 minutes
and sample for field tests collected, water clear.
Chloride: 5 ppm; hardness: 1 grain per gallon (17 ppm);
pH: 6.5; iron: 1.0 ppm. Water sample for complete
chemical analysis collected. Results of this analysis not
available at time of this writing.

4:50 p.m. - Driller returned to Tazewell, Tennessee.

PUMPING TEST MADE ON TEST WELL AT
HENSLEY FLAT, AUGUST 2, 1967

The driller reported he cleaned and developed the well for about 4 hours with compressed air.

PUMP SETTING - Intake of 5 H.P. submersible pump set at 433.5 feet below top of casing which is 2.0 above land surface. The intake was 18.5 feet above the bottom of the well. However, the pump was raised 13.5 feet after a short pumping test because sand was clogging the pump causing overload circuit breakers to trip. Thus, the pump intake is 422 feet below top of casing.

AIRLINE SETTING - Bottom end of 1/4 inch galvanized pipe was set 2 feet above pump intake. Total length of airline from bottom to center of gage (set at top of casing) was 420 feet. Airline was clogged when installed. At time of test, airline removed and cleared of sand.

DISCHARGE PIPE - One and 1/4 inch galvanized pipe discharging through a gate valve thence to 1-inch plastic pipe at land surface about 15 feet from the well. Discharge measured by using stopwatch and 3-gallon bucket.

DURATION OF TEST - Wednesday, August 2, 1967. After 15-minute test during which time overload switches caused pump to stop. Pump raised and pumped for 7 hours.

PUMPING RATE - Stabilized at 7 gallons per minute.

STATIC WATER LEVEL AT START OF TEST - 240 feet below top of casing.

PUMPING LEVEL AT END OF PUMPING - 415 feet below top of casing.

Data on water levels and pumping rates during the test are summarized in the following table:

Date	Time	Depth to water ^{1/} below top casing (feet)	Yield of well (gpm)
Aug. 2, 1967	1425	240	
	1426	250	25.7
	1428	269	25.7
	1430	278	25.7
	1432	306	25.7
	1435	334	25.7
	1439	364	25.7
	1443	388	25.7
	1445	408	25.7
	1458	409	9.0 ^{2/}
	1520	411	6.6
	1535	410	7.8 ^{2/}
	1545	412	7.2
	1555	411	7.2
	1630	412	7.8
	1650	415	7.0
	1700	412	6.4 ^{2/}
	1830	412	7.8
	1900	415	7.5
	1930	415	7.5
	2030	415	7.5
	2125	415	7.0

^{1/} Depth to water measured with air line.

^{2/} Output of pump adjusted to stabilize drawdown.

RECOVERY TEST ON TEST WELL
AT HENSLEY FLATS, AUGUST 2, 1967

Time since pumping began (minutes)	Depth to water ^{1/} below top of casing (feet)	Remarks
2125	415	End of pumping.
2128	415	Pump off.
2129	415	
2130	415	
2131	412	
2132	408	
2133	404	
2134	402	
2135	399	
2136	396	
2137	394	
2138	390	
2139	388	
2140	386	
2145	372	
2150	360	
2155	348	
2200	338	Air tank out of air. End of test.

^{1/} Depth to water measured with air line.

RECOVERY TEST ON TEST WELL
AT HENSLEY FLATS, AUGUST 4, 1967

Time since pumping began (minutes)	Depth to water ^{1/} below top of casing (feet)	Remarks
1600	214	End of pumping. Pump off.
1602	214	
1604	215	
1605	212	
1606	205	
1607	200	
1608	195	
1609	190	
1610	185	
1611	180	
1612	175	
1613	171	
1614	165	
1615	160	
1616	155	
1617	150	
1618	146	
1619	140	
1620	136	
1622	127	
1623	123	
1624	118	
1625	114	
1630	87	
1635	68	
1639	51	
1640	48	
1645	41	
1650	33	
1655	30	
1700	29	End of test.

^{1/} Depth to water measured with air line.

Docket Information

Number of Documents in Docket 11

Documents Dated from 6/13/1967 to 1/26/1968

Docket Compiled: 2/15/2011